was filed, had possession of the claimed invention. Specifically, the Examiner believes the numeral "350" in line 5 should read either "360" or "650". Applicant respectfully disagrees. This number is the denier of the yarn that may be used to form the fabric of the present invention. As defined in the art, "denier" is the weight-per-unit length of a yarn. Those skilled in the textile art understand the differences in denier and how a range of yarn deniers may be employed, consistent with the desired final product and the types of weaving or knitting machines used to form the fabric.

The Examiner also objects to the phrase "air or moisture impervious" in Claim 25. Claim 25 is herein amended to remove that phrase.

Claim 25 is further rejected under 35 U.S.C. 103(a) as being unpatenable over Yagi et al.

Applicant's Invention

Applicant's invention is directed to a method for making a cut and puncture resistant laminated *fabric* that is highly flexible and impervious to air and fluids. The method comprises a first step of selecting a fabric that is formed from high performance yarns. The yarns are selected from the group consisting of extended chain polyethylene, ultra high molecular weight polyethylene (linear, or non-crosslinked ultra-high molecular weight polyethylene, as is the conventional form), and aramid. Yarns having a denier between about 350 and 1,200 have been found most suitable for forming a highly flexible, i.e., not rigid, fabric that can be rolled or easily flexed to conform to an opening or article to be covered.

A thin film of thermoplastic material is positioned on at least one side of the fabric. The thermoplastic film is selected from high density polyethylene, low density polyethylene, and ethylene vinyl acetate and desirably has a thickness of only between about 4 mils and 24 mils. As described in Applicant's specification, it has been found that "polyethylene and EVA films adhere well to fabrics constructed from high performance polyethylene fibers...given sufficient heat, time, and pressure".

The thermoplastic film may also be tacked to the fabric as an intermediate step. Once the thermoplastic film has been positioned on/tacked to the fabric, a pressure of between about 50 psi and 500 psi is applied to the fabric and film at a temperature of between about 230 degrees Fahrenheit and 290 degrees Fahrenheit. The temperature and pressure are maintained for between about 5 minutes and 15 minutes. It has been found that this temperature and pressure

combination for a contact time of 5 to 15 minutes causes the thermoplastic film to soften and bond with the fabric. Additionally, some portion of the film is forced into the interstices of the fabric construction.

Thus, Applicant's invention is concerned with creating a composite fabric and film construction that possesses outstanding durability. Any chemical bonding or alterations in crystalline structure are not important so long as the physical properties (cut and puncture resistance, flexibility, and impermeability) are achieved in the end product.

Yagi et al. Is Different

Yagi et al. reference is directed to a fiber-reinforced polymer, molded, solid body, formed of the broad field of polymers, having a high tensile and flexural strength; i.e., low flexibility, and good electrical characteristics. The solid body is formed by applying a molten thermoplastic to the reinforcing material. Yagi et al. is not intended to be flexible in that the likely end use of Yagi et al.'s molded body is in the production of circuit boards, and the like. In fact, Yagi et al. is intended to be non-flexible. Even if it were flexible, Yagi et al.'s body is formed by a substantially different process and results in a body that is not a cut and puncture resistant, protective fabric construction.

Yagi et al. does not use ultra-high molecular weight polyethylene as it is known in the art. Rather, Yagi et al. forms a matrix of a molecularly oriented and silane-crosslinked ultra-high molecular weight polyethylene fiber, wherein at least part of the polymer chain constituting the formed body has a melting point improved over the inherent melting point of the starting ultra-high molecular weight polyethylene. Ultra-high molecular weight polyethylene is not the same polymer as molecularly oriented and silane-crosslinked ultra-high molecular weight polyethylene. As those skilled in the chemical arts will appreciate, crosslinking involves the attachment of two chains of polymer molecules by bridges, composed of either an element, a group, or a compound that join certain carbon atoms of the chains by multiple primary chemical bonds. Cross-linking has the effect of changing a plastic from thermoplastic to thermosetting. It also increases the strength, i.e., the rigidity, of the material. See Hawley's Condensed Chemical Dictionary, 14th ed., at 309.

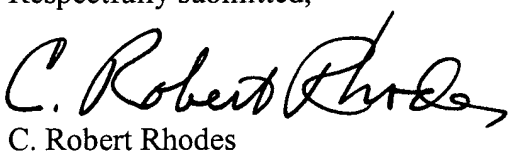
To those skilled in the chemical arts, ultra-high molecular weight polyethylene is not crosslinked; rather, it is conventionally known as being linear, or non-crosslinked. In short,

Applicant's fabric is formed from a material that is substantially chemically different from that of Yagi et al. Applicant has therefore amended Claim 25 to clarify the conventional form of ultra-high molecular weight polyethylene.

Conclusion

Applicant believes this case is now in condition for an immediate allowance with Claims 25-29 and such action is respectfully requested. If any issue remains unsolved, Applicant's counsel would welcome the opportunity for a telephone interview to expedite allowance.

Respectfully submitted,



C. Robert Rhodes
Registration No. 24,200
Lewis S. Rowell
Registration No. 45,469
WOMBLE CARLYLE SANDRIDGE & RICE, PLLC
300 N. Greene Street, Suite 1900
Greensboro, NC 27401
(336) 574-8090

Date: July 7, 2003
File No.: 3781-11 (03781.0010.9)

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please add new Claims 26-29. Please amend Claim 25 as follows:

25. (Amended) A method for making an impervious cut and puncture resistant laminated flexible fabric, comprising:

(a) selecting a fabric formed of high performance yarns, the yarns being selected from the group consisting of extended chain polyethylene, non-crosslinked ultra high molecular weight polyethylene, and aramid and having a denier between about 350 and 1,200, the fabric having first and second sides;

(b) positioning a thermoplastic film over at least one of the first and second sides of the fabric, the thermoplastic film being selected from the group consisting of high density polyethylene, low density polyethylene, and ethylene vinyl acetate and having a thickness of less than about 24 mils;

(c) applying a pressure of between about 50 psi and 500 psi to the fabric and thermoplastic film at a temperature of between about 230 degrees Fahrenheit and 290 degrees Fahrenheit; and

(d) maintaining the pressure and temperature for between about 5 minutes and 15 minutes so that the thermoplastic film softens and bonds with the fabric[, thus making the fabric air and moisture impervious].

26. (New) The method of Claim 25 further including the step of tacking the thermoplastic film over at least one of the first and second sides of the fabric before applying a pressure to the fabric.

27. (New) The method of Claim 26 wherein the tacking step is conducted using a heated calender roll device.

28. (New) The method of Claim 26 wherein the tacking step is conducted using a heated flat press.

29. (New) The method of Claim 25 wherein the step of applying pressure to the fabric is conducted using a hydraulic press.